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ABSTRACT

This report describes the activities of a group assigned to evaluate and make recommendations about the potential usefulness at the National Technical Institute for the Deaf (NTID) of a computerized career guidance system, the System for Interactive Guidance and Information (SIGI), which combines value orientation, decisionmaking processes, and information dissemination to assist the counselor in providing guidance to the student. Following a section on the nature of the SIGI system (system courseware, hardware requirements, and occupational data base), other sections cover evaluation by other users of the SIGI system, applicability to NTID students, approaches to student utilization, and support requirements for the system. Finally, the document contains recommendations that the SIGI system be installed at NTID for a minimum of three years and that other conditions (for example, provisions for counseling) be met to support the system. References and an estimated cost breakdown are appended. (LMS)

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SIGI

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System of Interactive Guidance and Information

A Study of the Use of a Computer-Based Aid to Career Decision-Making at the National Technical Institute for the Deaf

OE 011 980

Preface

In July, 1974, after an initial review of SIGI by four NTID representatives, it was thought that a field test of SIGI in the NTID environment was necessary. This test would have required a significant investment in hardware, maintenance, and monitoring of student performance on the system, and in several other areas. Nonetheless, this approach was deemed appropriate and work moved ahead, considering legal questions about modifications of SIGI (Fall, 1974), availability of hardware to the RIT Department of Computer Science (Winter and Spring, 1975), and hardware leasing arrangements (June, 1975).

In June, 1975 the Dean for NTID approved approximately $25,000 necessary to field test SIGI for one year. However, the hardware leasing firm made a last minute change to their proposal that eliminated the ability to cancel the hardware lease after one year if the NTID SIGI field test proved negative (Summer, 1975). The alternative lease agreement would have required NTID to enter into a three-year investment of more than three times the original sum, regardless of the field test outcome. This fact demanded that a broader based, in-depth assessment of SIGI be conducted before a commitment be made.

Accordingly, in October, 1975, a Task Force was appointed composed of NTID staff members with a variety of functions and expertise.

The objectives of the Task Force included the evaluation of SIGI's fundamental quality as a facilitator of career decision-making, its capabilities as a counseling tool, the quality of its occupational data base and the degree to which its language level is compatible with NTID students' capabilities.

The Task Force met regularly, formulating a plan for studying SIGI's feasibility (December, 1975). During the Winter Quarter of 1976 members completed gathering information from a variety of sources reflecting specialized needs. SIGI was also reviewed in action at State University College at Brockport. Additional sources of information included existing SIGI field test locations across the country as well as Educational Testing Service. During the spring it was determined that an observation of NTID students interacting with SIGI would be essential to the decision-making process. This interaction occurred on June 14 and 15, 1976.

This report summarizes the findings of the Task Force and makes recommendations concerning use of SIGI at NTID. There also exists an appendix containing a variety of information concerning the system. Since this information is quite lengthy, one copy of the appendix has been prepared and it is on file in my office.

Richard Giandana
Chairperson
September, 1976

Introduction

Employment conditions among deaf persons have been chronically depressed (Lunde and Bigman, 1959, and Crammatte, 1968). Severe underemployment with a majority of participation restricted to the "secondary" labor force, has severely reduced the lifetime earnings potential of deaf persons (Weinrich, 1972). These conditions, and others not mentioned, have deprived deaf persons of full participation in the American experience. To counteract these problems, the National Technical Institute for the Deaf (NTID) was established by Public Law 89-36 to provide a "residential facility for the post-secondary technical training and education for persons who are deaf, in order to prepare them for successful employment".[1]

The NTID Guidelines (U.S. Department of Health, Education and Welfare, 1966) specified that the "Institute will create the opportunity for more deaf persons to engage in satisfying occupations that are consistent with the students' aspirations and ability and the requirements of society (p. 3)." To assist in accomplishing this directive, The Guidelines further mandated the Institute to provide "an effective and continuing student guidance, evaluation, and counseling program (p. 9)."

When fully operational the yearly NTID enrollment will total 750 full-time equivalent students. Typically, these students arrive at NTID with an average reading level of eighth grade (Walter, 1974) and a

[1] Public Law 89-36, 89th Congress, H.R. 7031, June 8, 1965, Sec. two.

narrow frame of reference that is probably the result of a restricted educational input (see "Schools and Classes", 1972). With the combination of an educationally handicapped clientele, a short time of matriculation (averaging two and one half years), and limitations on professional manpower, NTID must seek to provide new and innovative methods of providing career counseling and guidance services to its student body.

Wernick, Tiedeman, Eddy and Bosdell (1975) described a model of the career counseling process that is pyramidal in design and composed of nine levels with each level building on the previous one. This model consists of:

Level One (bottom of the pyramid) -- Orientation and Awareness;

Level Two -- Assessment of Self;

Level Three -- Occupational and Career Objectives;

Level Four -- Setting of Career Objectives;

Level Five -- Work Experiences;

Level Six -- Career Contacts;

Level Seven -- Preparation for World of Work;

Level Eight -- Placement, and

Level Nine -- (top of the pyramid) -- Recycling.

The model outlined above emphasizes the complexity of the career counseling process. Career counseling must not only provide occupational information but must also include an adequate assessment of an individual's self and his likes and dislikes.

A vast amount of information must be made available to provide students with adequate input so that they can not only assess their own needs but those of the job market and the requirements of training for acquiring a job. It is unrealistic for one person to be able to provide the variety of information with the speed and accuracy that is necessary to meet the needs of a student making inquiries concerning specific career areas, while holding students' interest.

For this reason there are clear benefits to be gained from the power of a computer to store large amounts of information, provide immediate access to it, and adjust to the individual needs of students. Computer hardware and software has now reached a stage where such systems are potentially applicable for assisting the career counselor in providing services to his counselees.

The purpose of this report is to describe the activities of a group assigned the task of evaluating the potential usefulness, at NTID, of one such computerized career guidance system. It should be stressed, that only one system will be evaluated throughout the remainder of this report. This system is referred to as the System for Interactive Guidance and Information (SIGI) marketed by the Educational Testing Service (1974).

While the task force recognizes that other systems do exist such as:

Occupational Information Access System (OIAS) (1972);

Career Information System (CIS) (1974);

Computerized Vocational Information System (CVIS) (1974);

Information Systems for Vocational Decision (ISVD) (1969);

they were not formally evaluated by this committee.

All the above systems seem to provide only access to information and do not attempt to incorporate a systematic approach whereby individual needs and values are taken into account in the decision-making process. It is the feeling of the task force that SIGI represents more than just an automated filing cabinet which provides the student ready access to career information. Good career guidance consists of not only providing raw interpretable information to students but in providing students methods for making rational career choices while emphasizing freedom of choice and developing understanding of the processes involved in that choice (Katz, 1969).

It is the feeling of this group that SIGI is the only computerized system in existence that takes into account a combination of value orientation, decision-making processes and information dissemination to assist the counselor in providing guidance to the student. The purpose of this report, then, is to summarize the functions of the task force over the past ten months and to make recommendations concerning the possible application of the SIGI System at the National Technical Institute for the Deaf.

Nature of the SIGI System

SIGI was designed to apply computer technology to assist clients in examining their values toward work, to explore career options, to interpret relevant occupational data, to formulate tentative career plans, as well as to modify these plans based on fresh insights, new experiences, and added information. But, because SIGI was developed to be implemented with hearing clients in Junior and Community Colleges it was determined that an assessment of SIGI's feasibility for improving the quality of career decisions of NTID's deaf clientele would be required before SIGI could be installed at NTID.

System Courseware. The SIGI courseware consists of six interrelated sub-systems, Values, Locate, Compare, Prediction, Planning, and Strategy. Each involves a given activity and also concerns a different step in a decision-making process. Table 1 provides an explanation of the sub-systems, the activity the student undertakes in each, and the step each sub-system occupies in the decision-making model.

Each sub-system has two functions. The first is to organize and dispense information. In this respect the systems are more or less independent of one another. The Values sub-System helps students organize their values without regard to any specific occupation. The Locate sub-System lists occupations on the basis of their potential to satisfy certain values, but it does not concern any other kind of occupational information. The Compare sub-System is a kind of encyclopedia of information. It is not confined to the Values dimensions. Each system occupies a separate realm.

TABLE 1

The SIGI sub-systems and their place in the decision-making paradigm.

Sub-System	What the student does	Step in the decision-making process
(Introduction)	Learns concepts and uses of major systems	
1. VALUES	Examines 10 occupational values and weights the importance of each	Find out what you want
2. LOCATE	Puts in specifications for 5 values at a time and gets lists of occupations that meet the specifications	Find out where you can get what you want
3. COMPARE	Asks questions and gets specific information about occupations of interest	Get information for judging the advantages and disadvantages of your options. Narrow down your list of options.
4. PREDICTION	Finds out probabilities of getting various grades in key courses of programs that prepare for occupations	Assess the probabilities of success for each option
5. PLANNING	Sees the steps to be taken to prepare for an occupation, including the program at the local college	Plan a course of action for each option
6. STRATEGY	Evaluates occupations in terms of the rewards they offer and the risks of trying to enter them	Apply a rational decision-making strategy to occupational choice

The second function is to teach a step in a decision-making process. In this respect the sub-systems are very much interdependent. The purpose of each is defined by the place it occupies in the process. Thus the Locate sub-System depends for its effectiveness on the students having previously determined which values are important to them. The Compare System becomes impossible unless students know what occupations to ask about. Although a system can be detached and used as a separate resource when the purpose is to get information, it cannot be removed from the context when the purpose is to learn the decision-making process.

This duality of function is obviously important in counseling. Some students may need factual information that one part of the SIGI system or another can supply. Others may need the whole paradigm for decision-making or may lack insight at some step in the process. The purposes for which the SIGI system is used depends to some extent on the ability of the counselor to use it in different ways to meet different needs.

This is a brief sketch of the courseware structure of the SIGI System. Anyone interested in a detailed account of the nature of the system is referred to the Counselors' Handbook for SIGI by Warren Chapman (1975).[2]

Hardware Requirements. The SIGI system is one which allows a student to interactively communicate with a computer program and data base. The

[2]See the Appendix for a copy of this handbook.

resources required to provide this capability can be broken down into:

1. EQUIPMENT

    a. Student Stations (Terminals)
    b. Communication Cables
    c. Mini-computer (Digital Equipment Corp.)

2. SOFTWARE (PROGRAMS)

    a. E.T.S. Programs
    b. Digital Equipment Corporation programs.

3. PERSONNEL

    a. Student Proctor
    b. Computer Operator
    c. System's Maintenance Programmer.

4. INSTALLATION/MAINTENANCE SERVICES

    a. Equipment
    b. Software
    c. Space

Because of the nature of the SIGI system the types of equipment and software are pre-defined and allow for very little variation from installation to installation. As a result, the definition of resources, selection of vendors and acquisition costs can be easily determined. Yet there are other options to be considered and adopted if NTID decides to install the SIGI system. Listed below is a brief description of these options and the assumptions made for this analysis:

1. The number of student stations. The SIGI system, by expansion or contraction of equipment facilities, can simultaneously accommodate two to more than 16 students. For the purposes of this analysis and cost determination,

four student stations were considered adequate for the first two or three years of operation.[3]

2. Location of student stations. Location of terminals is relatively unimportant to the system. They may be centrally located in one area or dispersed into different areas. There are limitations on the cable length from each terminal to the computer. The assumption made for this analysis, is that each station will be located within 1,000 feet of the NTID Computer Room.

3. Location of the computer equipment. Location of the computing equipment is dictated by environmental considerations (e.g., air conditioning, humidity, power). For the purposes of this analysis both the NTID Computer Room and the Mini-computer laboratory in the Annex are considered.

4. Acquisition Method. The necessary equipment resources may be acquired either through outright purchase or through leases ranging from two to five years. Difficulties in obtaining lease estimates precluded that option from this analysis and all costing figures are based upon purchase of equipment.

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[3] This assumes a capacity of 3 hours/student per session (2 students per day per terminal). This equals 8 students per day times 150 days or 1200 student sessions a year.

Two alternatives have been considered for determining an acceptable method of acquiring and operating a SIGI system.

1. NTID Purchase

   NTID may purchase all resources necessary for acquiring and operating the SIGI system. Highlights of exercising this option are:

   A. Complete flexibility in use of the system. There are no restrictions on scheduling the use or availability of the system.

   B. NTID control and responsibility for maintenance, staffing and expansion of the system.

   C. Higher cost as a result of reliance on equipment vendors to provide contractual service agreements.

2. NTID/CS & T Purchase

   Dr. Cheng has indicated an interest in expanding his current equipment to support the SIGI system. NTID would provide monies for this expansion. Highlights of exercising this option are:

   A. Limited flexibility in use of the system. NTID's use could not exceed 40 hours per week on a fixed schedule basis.

B. C.S. & T. control and responsibility for maintenance of computer equipment and staffing.

C. Lower cost as a result of using students and faculty to provide equipment maintenance and software support.

D. Dr. Cheng would retain title to all equipment.

This analysis is intended to indicate that either of the above alternatives are feasible but not to make a recommendation of one above the other. Detailed discussions of differences between the two alternatives are required before a recommendation can be reached.

Included as an addendum to this paper are detailed specifications and purchase costs associated with the two options above. Based upon the options above and for each of the two alternatives, the estimated cost of acquiring SIGI is:

First year costs:[4]

Alternative #1 - NTID Purchase	$85,700
Alternative #2 - NTID/CS&T Purchase	$78,500

Receiving costs for second and following years:

Alternative #1 - NTID Purchase	$14,588
Alternative #2 - NTID/CS&T Purchase	$11,400

[4] ETS has indicated that the system software for the first year would be free to NTID. This would reduce the costs to 80,700 and 73,500 respectively.

Space and personnel requirements do not represent major problems to either approach. From a hardware point of view no additional NTID employees would be required, with the exception of a Proctor (cost of this is not included in the figures above). Space for computer equipment does not represent any problems but is limited to available space in the Annex laboratory or in the NTID Computer Room. Space for student terminals will be dictated by operational concerns. Among valid alternatives would be to locate the stations in the Dormitory area, in Counselor's offices or the Applications Resource Room.

Occupational Data Base[5]. One of the major impacts of the SIGI system is the utilization of an occupational data base. The SIGI occupational data base provides the grist from which clients grind out tentative career decisions as they progress through SIGI's sub-systems summarized in Table 1.

The SIGI occupational data base includes information on the work activities, entry requirements, income, personal satisfactions, conditions of work, and employment outlook for 155 occupations (See Appendix for complete list), 12% (20/155) of which correspond to 86% (20/23) of NTID training programs. Sixteen percent (26/155) of these occupations correspond to 50% (26/51) of RIT curricula. This information, for the most part, is

[5]A more detailed account of the Data Base is available in a paper by Martin and Passmore (1976) titled: Applicability of the SIGI Occupational Data Base to NTID's Curriculum Research and Career Counseling Needs. This paper is contained in the Appendix for this report.

gleaned by Educational Testing Service from the Occupational Outlook Handbook, although supplementary and corroborating information is sought from, among others, federal agencies, unions, professional organizations, and occupationally-related literature. According to ETS, an update of SIGI occupational information is planned for at least every three years.

Some conclusions can be made concerning the adequency of the occupational data base.

1. The SIGI occupational data base appears to be a quality summary of some of the most accurate occupational information available.
2. SIGI planners seem to make reasonable attempts to incorporate information from a wide range of data sources into the occupational data base.
3. SIGI planners promise that their SIGI occupational data base will receive timely updating, given the publication cycles of its information sources.
4. The SIGI occupational data base itself seems to provide little additional information to the "prepared" career counselor.
5. The SIGI occupational data base itself would probably add little perceptible increment to the labor market information already available to NTID occupational research personnel for the conduct of the NTID Employment Outlook Research Program.

Evaluation by Other Users of the SIGI System

Contact was made with other users of the SIGI system across the United States by telephone and letter. While very little hard evaluative data exists on the use of the system, it is generally indicated by counselors and other users that the system seems to achieve the objectives for which it was designed--to provide an orientation to the process of career choice. The favorable response on the part of other users is generally indicated in data provided by Educational Testing Service from a questionnaire given to counselors at the three SIGI field-trial colleges.[6] While other systems do exist, as indicated above, it would seem that the SIGI system is one that is relatively easy to implement, and one that provides a broad base for the career counseling process. It is our feeling that only through a long-term, well planned program can a direct determination of its impact be made.

Applicability to NTID Students

As was indicated in the introduction to this paper the SIGI system has been viewed on a number of occasions by various NTID personnel. While the system seems to have face validity for hearing students its effectiveness with the hearing impaired is still an open question. Questions that concerned members of the task force related to the ability of deaf students to handle the language level and the assumptions of experiential frame of reference made by the system. The committee decided that the only way an adequate evaluation of these questions could be carried out

[6] Data concerning these questionnaires are contained in the Appendix to this paper.

was to choose a small number of NTID students and closely observe their interaction with the SIGI system. At the end of the Spring Quarter, eight NTID students accompanied members of the task force to Princeton, New Jersey for two days to use the SIGI system.

The committee purposely chose students who represented a range of language abilities - one student at the English two-level, three at the three-level, two at the four-level, and two at the five-level. It was felt that this range would allow for evaluation not only of the performance of the average student (the three-level student) but also students with other language abilities. Since such a small number of students participated, it was decided that close observation of the students was necessary during their time on the system. In addition, questionnaires provided by Educational Testing Service were completed by students to measure their impressions of the SIGI system.

Space in this report will not permit a detailed analysis of all the data from the students, but this information is contained in in the appendix and anyone desiring further to analyze the data is welcome to do so. What will be presented in this report is a summary of the information gained from the students' interaction with the SIGI system.

Student Response Consistency. Inconsistent responding, as evidenced by undue looping through a sub-system, would be caused by not comprehending the structure or language of the system. Accordingly, it was necessary

to analyze students general ability to consistently respond to the system. From this analysis it would seem that students with four and five-level reading abilities can respond to the system more consistently than do students at the three-level or the two-level. However, this does not mean that the system is unusable for students at the three English level or below.

While all students were able to consistently answer questions, for some (representing a cross-section of language levels) this was true only as the questions related to a very narrow range of occupations. Usually these values and abilities were predetermined on the part of the student. In a sense they locked into an area and held strictly to these occupations. While this fact may reflect some rigidity on the part of the students it may also indicate that the students were able to comprehend what was required of them by the system. It would seem that NTID English two and three-level students are able to use the system with the assistance of a counselor or research assistant. Table 2 provides data concerning correct responses to questions relating to decision making strategies. It must be stressed that our analysis is based on only a small number of students at NTID and thus overall generalization should be made cautiously.

TABLE 2

Correct responses of 8 NTID students on questions relating to decision making strategies of SIGI.

Student	Reading Comprehension	English Score	% Correct Perform
A	11.9	32	80
B	8.9	26	79
C	9.5	27	76
D	11.1	32	71
E	9.3	27	66
F	8.9	23	45
G	8.9	26	40
H	8.8	25	33

Student Attitudes toward SIGI. Attitudinal data was gathered from questionnaires filled out by the NTID students upon completing the SIGI system. Generally the attitude questionnaires seem to indicate that the students felt that the SIGI system was very helpful for them in getting information concerning jobs. Another important point is that they responded very favorably to the information that the system was providing about values. The students seemed to have comprehended the importance of defining their values in the process of making a career choice. This is one of the major purposes of the SIGI system and if our students were able to comprehend that relationship it may be that the system is valuable as a counseling tool from this point of view.

A question was asked concerning the writing style and vocabulary in the SIGI system. All students, with one exception, indicated that the vocabulary and writing style was just right. The one student indicating that it was too difficult was at the three-level. Students also indicated that they would recommend SIGI to other students. The students felt this system would be good for NTID students provided appropriate steps were taken to adapt it for use with deaf students.

Another important comment on the part of the students consisted of a set of questions as to whether they would go to a career counselor or to SIGI to get information of various kinds. Table 3 provides the responses for eight students on each of these questions.

Table 3

Perceived Value of SIGI in the Career Decision Making Process for NTID students.

Question	Number of Students		
	SIGI Alone	Counselor Alone	SIGI & Counselor
Plan program of study	2		6
Get information about occupations	7		1
Confirm an occupational choice	2	1	5
Find occupations that fit values	5	2	2
Find out about financial aid	3	3	2
Make values more clear	3		5
Resolve conflicts about occupational choice	2	1	5
Estimate chances of success in a program	5	1	2

It is interesting to note that the students seem to have been able to identify the strong points of SIGI and those areas where a counselor would be of added benefit. A counselor seems to be of added benefit, from the students point of view, in planning a program of studies, in confirming an occupational choice, in making values more clear and resolving conflicts about occupational choice. SIGI, from their point of view, seems to be better at getting information about occupations, estimating chances of success in a program and finding occupations that fit their values. This seems to fit very nicely with the objectives of the SIGI system as specified by Educational Testing Service.

In summary it would seem that these eight students are quite positive about the applicability of SIGI in the career decision-making process at NTID. It should be pointed out, however, that the students were quite clear that the system should be used in conjunction with a good counseling program, and that adaptations may be necessary to fit the special needs of students at the National Technical Institute for the Deaf. The task force feels that these perceptions are encouraging on the part of our students.

One last point to be made concerns a question which asks, "compared to other kinds of occupational information how would you rate the occupational information presented in SIGI?" All eight students indicated that obtaining the occupational information presented by SIGI was better than any other way.

Language Level. It is the observed opinion of the task force that the SIGI reading level is indeed difficult for students who are below the average language level of NTID students. In other words for about half of the NTID student body the SIGI system will probably present some degree of difficulty from a linguistic point of view. However, we feel that the effects of this linguistic deficit can be neutralized in a number of ways: (1) by providing a preview of the aspects of the system and its purposes; (2) by defining certain terms prior to students beginning this system, and (3) by close counselor interaction with the student while he is proceeding through the system, that is to help the student by answering any questions he may have. We feel that these steps will help in making the system usable for another 25 to 30% of NTID students, or a total of about 80% of the population.

The committee feels, therefore, that the students generally functioned far better on the system than had originally been anticipated. While language is indeed a problem for deaf students it does not seem to be a problem that would necessarily rule out the utilization of the SIGI system with them, especially if reasonable support is provided the students in the use of the system.

Approaches to Student Utilization.

The literature (Tiedeman, 1968; Roth, 1971; James & Smith, 1972) stresses the importance of augmenting computer assisted counseling with a well organized and integrated system of personal and career counseling. As such it is the feeling of this committee that the organization of the NTID Career Counseling function must be structured in such a way as to

make use of available system courseware and hardware (SIGI). Tiedeman (1966) stresses four important elements relating to educational reorganization to effectively implement any computerized system.

1. the school must emphasize inquiry as a major pedagogy;
2. books, films, the computer and other materials must be effectively coordinated;
3. counselors must be accepting of the system, and
4. the coordinated effort should be available in a location other than an academic area.

Bringing the SIGI system to NTID will not, in itself, provide for better counseling. It is imperative that the NTID counseling group be structured in such a way as to make optimal use of the SIGI system. It is not intended that every student at NTID make use of SIGI services; although, potentially, all students could derive some benefit from that experience. There are several types of students that would be included in the intended user population for SIGI: (1) SVP students who have no clear career goals; (2) students who remain undecided throughout their freshman year; (3) students not satisified with their career decisions and who wish to explore other options; (4) matriculating students from AAS level to BS level; (5) students who wish to validate their career choice; and (6) students who are not academically successful in their chosen program. These populations can be identified by self-referrals, career counselors, instructors and the Office of Career Opportunities.

Due to the variety of language competencies among the NTID students and the different types of vocational problems presented, there will be a need to

find a number of unique ways for students to interact with SIGI. The possible approaches are:

1. Individual student use with minimal need for support services from a SIGI resource person, but with feedback sessions with a career counselor.
2. Individual student use with appropriate support services in counseling provided by the referring career counselor as the student and counselor go through the system together.
3. Use of SIGI by groups of students as part of a requirement for a career decision-making course, requiring appropriate support from the resource person and the course instructor.
4. Group use of SIGI for purposes of efficient use of staff time. This would include group introduction support from a resource person and continued individual support as needed. Each student would have feedback sesssions with a career counselor.
5. Individual use of SIGI by students who have gone through all the SIGI sub-systems but wish to return at a later date to different sub-systems. These students may not require any support systems.

Support Requirements

Since the SIGI system cannot stand alone and would require, for support of NTID students, counselor interaction, it is suggested that the four CRT terminals and print-out equipment be housed in a three room cluster located in the dormitory complex. This three room cluster would be composed of a one room facility for the SIGI terminals and print-out

equipment using possibly, a study carrel arrangment; a classroom accommodating ten people for purposes of group instruction and discussion; and a third room to be used as a career information library. It is projected that a minimum level of operation (8:00 A.M. to 5:00 P.M.) would require the services of an "on duty" counselor/ coordinator, a resource assistant, and support from a research associate. This configuration should allow for maximum scheduling of students, adequate counseling support during the working hours, and adequate research support for the evaluation of the SIGI system. It is to be stressed that use of the system at NTID could be a significant adjunct to the counseling process.

Committee Recommendations

The recommendations of this committee are based on the notion that bringing a system into an environment will not insure the use of the system. Probably more important than the system itself is the nature of the environment within which the system resides. For this reason our recommendations will go beyond simply recommending the acquiring of the SIGI system.

This committee recommends that the SIGI system be acquired and brought into NTID and that certain other highly desirable conditions be met. These conditions consist of the following:

1. That a counseling environment be developed that will consist of a counselor/coordinator, a resource assistant to provide for scheduling, monitoring and assistance to students and a

research associate assigned 50% of the time to SIGI for evaluation purposes. We feel that, in addition to these personnel, a career information resource center of some kind be structured around the SIGI system. Such a center has been proposed in the past (POW, Department Project #3 - Self Knowledge in Career Information Development, 1977). We feel that without such a career resource center staffed by a counselor, the benefit of the SIGI system itself will be greatly reduced.

2. It is felt by the task force that considerable research effort be expanded on an ongoing basis to properly evaluate the SIGI system. The following questions need to be asked concerning the applicability of the SIGI system:

    1. What level of NTID student can handle the language of the SIGI system?
    2. What are the constraints in terms of experiential background of the SIGI system on the ability of NTID students to use the information?
    3. What are the restrictions of the SIGI system in terms of the career information it provides in light of the training options at the National Technical Institute for the Deaf?
    4. What criteria measures and test information must be developed in order that the full power of the SIGI prediction system can be implemented. (This question requires considerable interaction with people at

Educational Testing Service.) This research will allow for judgments concerning the potential success of a student in a specific technical area at the National Technical Institute for the Deaf.

It is recommended that the SIGI system be installed for a minimum of three years and that this three year time frame be considered an evaluation and testing period. At the end of this three year time frame judgments should be made as to the success of the SIGI system and recommendations concerning alteration in its coding, structure, and programming be made to NTID and the Educational Testing Service.

In summary it should be pointed out that we feel that the SIGI system alone provides a great deal of information and insight into work-related goals, and training in decision-making skills. But, without the monitoring of a skilled and trained counselor we feel that the system will be another piece of unused hardware. In order to increase the probability of success, we recommend the above career information programs be implemented concurrently with installation of the SIGI system. If such programs are not implemented we do not feel that the SIGI system would be of maximum usefulness to the National Technical Institute for the Deaf. It is our feeling that such a program would indeed demonstrate, as indicated earlier in the introduction to this paper, that NTID is fulfilling not only the upper part of the pyramid in terms of placement follow-up and recycling of her students, but also is stressing though not guaranteeing, the lower end of the pyramid in terms of an appropriate approach to counseling, career guidance and career decision-making.

Costs for installation and maintenance of the system are indicated in the Appendix to this report.

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Addendum

Estimated cost Breakdown for Purchasing a Four Terminal Computer System for SIGI

Item Description	Purchase Through Dr. Cheng				MTID Purchase			
	One Time Costs	Recurring Monthly Cost	Total 3-Yr. Outlay	Total 5-Yr. Outlay	One Time Costs	Recurring Montly Cost	Total 3-Yr. Outlay	Total 5-Yr. Outlay
Equipment Costs								
Computer Hardware	26000	0	26000	26000	39580	0	39580	39580
Computer Terminals	23385	0	23385	23385	23385	0	23385	23385
Building Modifications								
Communication Cables	11040	0	11040	11040	3000	0	3000	3000
Electrical	250	0	250	250	500	0	500	500
Telephone	35	11	431	695	35	11	431	695
Software Costs								
SIGI Software Lease/Updates	0	417	15000	25000	0	417	15000	25000
DEC Software Lease/Updates	5500	75	7300	9100	5500	75	7300	9100
Maintenance/Installation Costs								
Terminal Maintenance	0	234	8425	14040	0	234	8424	14040
Computer Maintenance	0	0	0	0	0	316	11376	18960
Computer Installation	1800	0	1800	1800	0	0	0	0
Computer Spare Parts	0	150	5400	9000	0	0	0	0
Operations Costs								
Supplies (Paper)	0	63	2268	3780	0	63	2268	3780
Computer Operator	0	0	0	0	0	0	0	0
Programming Support	0	0	0	0	0	100	3600	6000
* TOTALS *			$101,298	$124,090			$114,864	$144,040

Computer Equipment

Alternative #1 - NTID Purchase

QTY	DESC	Purchase Cost	Maintenance
1	11T34 MA CPU w/32K	29,900	278
2	16K Memory Expansion MS-11JP	5,200	50
1	DD11D 9 Slot Backplane	600	-
1	M7850 Parity Control	800	-
1	DZ11A Terminal Central	2,100	25
4	H312A Null Moderns	380	8
1	KY116B - Octal Keypad	600	-
Hardware Total		$39,580	361
1	RSTS/E Software	5,500	-
Total to D.E.C.		$45,080	-

Alternative #2 - NTID/CS&T Purchase

3	MSIIJP 16K Memory	7,800	$ 75
1	M7850 Parity Control	800	-
1	DD11D Backplane	600	-
4	H312A Null Moderns	380	8
1	RK11J-AA Disk Controller	9,900	81
1	RK05F-A Disk Pack	6,500	180
1	KJ11LB Octal Keypad	600	-
Hardware Total		$26,000	$344
1	RSTS/E Software	5,500	
Sub Total		$31,580	
1	Installation Charges	1,800	
TOTAL		$33,380	

Terminal Equipment

QTY	DESC	PURCHASE	MAINTENANCE
4	Texas Instrument #733RO	$ 5,995	$ 70
4	Delta Data #5000	17,390	$164
	Terminal Total	$23,385	$234

Supplies (Paper) Cost for Texas Instrument is:

12 rolls/month, 12cases/yr x $63/case = $756/year

Costing of Student Stations is done on a basis of 4 student stations. Cost for fewer or additional stations can be computed as follows:

1. NTID Purchase Alternative

   $5,900 to purchase terminals
   800 to lag cables

   $6,700 — $6,700 + $900/yr.

   $ 59/month for maintenance
   10/month for paper

   $ 75/month

2. NTID/CS&T Alternative

   $5,900 to purchase terminal
   $4,000 to lay cables

   $9,900 — $9.900 + $900/yr.

   $ 59/month for maintenance
   16/month for paper

   $ 75/month

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